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DEVICE FOR TESTING PARACHUTES IN A WIND TUNNEL,(U)

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AIR FORCE SYSTEMS COMMAND

DEVICE FOR TESTING PARACHUTES IN A WIND TUNNEL

By

I. M. Nosarev

FOREIGN TECHNOLOGY DIVISION

FTD-ID(RS)T-2094-78

EDITED TRANSLATION

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DEVICE FOR TESTING PARACHUTES IN A WIND TUNNEL

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U. S. BOARD ON GEOGRAPHIC NAMES TRANSLITERATION SYSTEM

Block	Italic	Transliteration	Block	Italic	Transliteration
А а	*А а*	A, a	Р р	*Р р*	R, r
Б б	*Б б*	B, b	С с	*С с*	S, s
В в	*В в*	V, v	Т т	*Т т*	T, t
Г г	*Г г*	G, g	У у	*У у*	U, u
Д д	*Д д*	D, d	Ф ф	*Ф ф*	F, f
Е е	*Е е*	Ye, ye; E, e*	Х х	*Х х*	Kh, kh
Ж ж	*Ж ж*	Zh, zh	Ц ц	*Ц ц*	Ts, ts
З з	*З з*	Z, z	Ч ч	*Ч ч*	Ch, ch
И и	*И и*	I, i	Ш ш	*Ш ш*	Sh, sh
Й й	*Й й*	Y, y	Щ щ	*Щ щ*	Shch, shch
К к	*К к*	K, k	Ъ ъ	*Ъ ъ*	"
Л л	*Л л*	L, l	Ы ы	*Ы ы*	Y, y
М м	*М м*	M, m	Ь ь	*Ь ь*	'
Н н	*Н н*	N, n	Э э	*Э э*	E, e
О о	*О о*	O, o	Ю ю	*Ю ю*	Yu, yu
П п	*П п*	P, p	Я я	*Я я*	Ya, ya

*<u>ye</u> initially, after vowels, and after ъ, ь; <u>e</u> elsewhere. When written as ё in Russian, transliterate as yё or ё.

RUSSIAN AND ENGLISH TRIGONOMETRIC FUNCTIONS

Russian	English	Russian	English	Russian	English
sin	sin	sh	sinh	arc sh	$\sinh^{-1}$
cos	cos	ch	cosh	arc ch	$\cosh^{-1}$
tg	tan	th	tanh	arc th	$\tanh^{-1}$
ctg	cot	cth	coth	arc cth	$\coth^{-1}$
sec	sec	sch	sech	arc sch	sech^{-1}
cosec	csc	csch	csch	arc csch	csch^{-1}

Russian	English
rot	curl
lg	log

2094

DEVICE FOR TESTING PARACHUTES IN A WIND TUNNEL

I. M. Nosarev

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In order to calculate the trajectories and horizontal and vertical velocity components of an object gliding on a parachute and to determine stability and other parameters of movement, it is necessary to find the dependences of the forces and moments acting on the parachute. These dependences are found by testing models of canopies with a rigid housing covered with cloth, plywood, a thin metal sheet, etc., in wind tunnels. Under natural conditions, the shape of the canopy varies considerably with the angle of attack. These changes cannot be reproduced on a rigid model.

It is possible to obtain flow about a parachute which completely corresponds to natural conditions in special cases. A device with hinge-attachment of the parachute behind the sling hoist links to the suspension or strut of the wind-tunnel balance is used for this purpose. Since these devices do not make it possible to test an unstable parachute, it is kept from oscillating by a special device which is attached to the apex of the canopy.

However, in this case the lateral force, lift and aerodynamic moment of the canopy cannot be measured by the balance.

We are proposing a device for testing parachutes in a wind tunnel which consists of a longitudinal shaft (a rod or pipe) which is installed on the superstructure or suspension of the stationary wind-tunnel balance. In order to measure all of the components of the aerodynamic forces and moments acting on the parachute or its soft model and to keep the parachute on the axis of symmetry, a detatchable lock containing a sleeve with small hooks for attaching the parachute slings is mounted on one end, and on the other - a sleeve with internal lengthwise splines into which the pins of the flange are inserted. The apex of the parachute canopy is screwed onto this flange.

In order to avoid twisting the canopy and the parachute slings

during the tests, an electric motor and gear drive are installed on the beam.

Figure 1 shows the parachute-testing device in question; Fig. 2 - the detatchable lock; and Fig. 3 - the sleeve for attaching the parachute canopy (cross section).

Fig. 1.

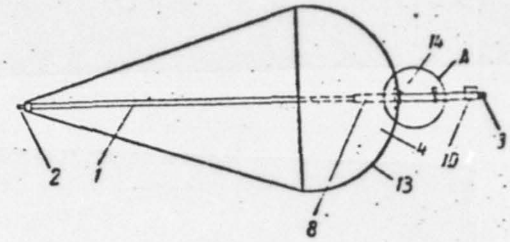


Fig. 2.

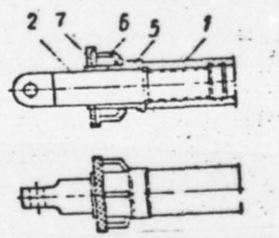
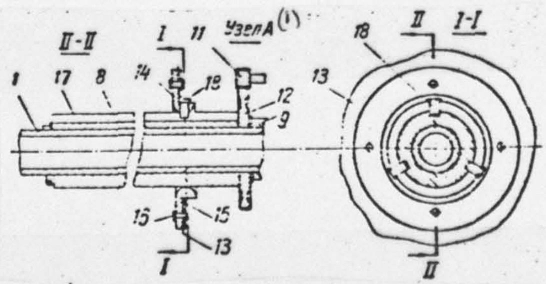


Fig. 3. KEY: (1) Assembly A.



The device consists of lengthwise shaft 1, which is attached to the strut or suspension of the stationary wind-tunnel balance (not shown in the diagrams) by means of assemblies 2 and 3. The lengthwise shaft passes from the axis of symmetry 4 of the parachute through the apex of the canopy to the sling hoist links. There is a detatchable lock (assembly 2) for attaching the sling hoist links at one end of the shaft. Depending on the number of hoist links on the parachute and their size, a set of sleeves 5 with small hooks 6 is made. The hoist links are locked by screw 7.

On the lengthwise shaft there is a sleeve 8 which rests against cylinder 9 and can be rotated by reversible electric motor 10. The moment and angular displacement are transferred by master gear 11 and slave gear 12.

The cloth and bands in the apex part 13 of the parachute frame are clamped between flange 14 and screw 15 by bolts 16. Flange 14 can move freely along sleeve 8 with internal splines 17. Pins 18 are held on the flange by screw 15 and are inserted into splines 17, keeping the parachute canopy from turning relative to bushing 8.

Even when the canopy is inclined at a small angle, the shape of the inlet hole markedly changes. This can result in the manifestation

of a large rolling moment. An asymmetrical parachute always has a rolling moment, which causes the angular displacement of the edge of the canopy and the slings (twisting) relative to the axis of the parachute. This changes the shape of the canopy. This displacement can be eliminated by using reversible electric motor 10.

Subject of Invention

1. This invention is a device for testing parachutes in a wind tunnel which consists of a lengthwise shaft (a rod or pipe) which is installed on the superstructure or suspension of the stationary wind-tunnel balance. It differs in that in order to measure all of the components of the aerodynamic forces and moments acting on the parachute or its soft model and to keep the parachute on the axis of symmetry, a detatchable lock consisting of a sleeve with small hooks for fastening the parachute slings is installed on one end of the beam, and on the other - a sleeve with lengthwise internal splines into which the pins of the flange which is used to fasten the apex of the parachute canopy to it with a screw are inserted.

2. A device like in §1 which differs in that in order to eliminate the possibility of twisting of the parachute canopy and slings during the tests, a reversible electric motor and gear drive are installed on the shaft.

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